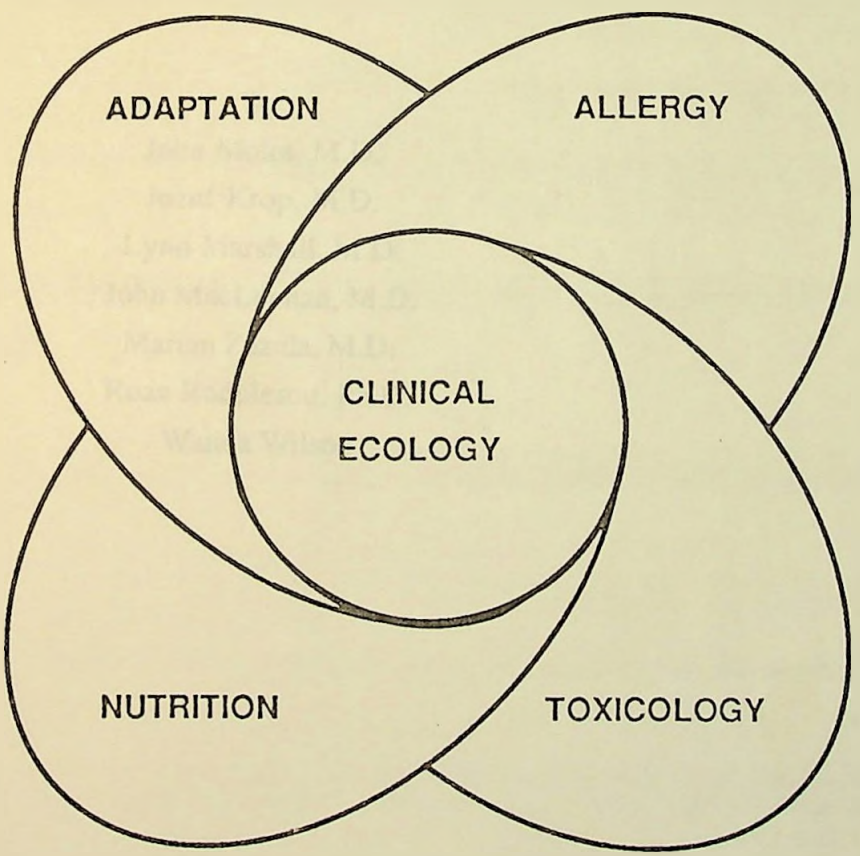
POSITION PAPER

OF THE

CANADIAN SOCIETY FOR CLINICAL ECOLOGY

AND ENVIRONMENTAL MEDICINE

1988



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INTRODUCTION

The Canadian Society for Clinical Ecology and Environmental Medicine (CSCEEM) was founded in 1985, and is comprised of physicians and scientists dedicated to helping patients attain and maintain optimum health. CSCEEM members are also engaged in developing new diagnostic and treatment concepts which have been proven effective in relieving the environmental aspects of illness. They aim to identify environmental agents, allergens, toxins and infectious diseases which compromise the body's homeostatic defences. When avoidance of environmental stressors is impossible, they favour specific immunotherapy and nutritional supplementation rather than the use of drugs to relieve symptoms. Different methods of stress management, as well as family education and support, are also applied.

In the United States, the American Academy of Environmental Medicine (AAEM), the American Otolaryngology Association, and the Pan-American Allergy Society, with a combined membership of approximately 2,000 physicians, support these principles. In addition, there are approximately 1,500 physicians who have taken American Medical Association Committee of Medical Education (CME) accredited instructional courses in ecological techniques since their inception in 1974. Similar organizations also exist in Britain, Australia, Germany and Italy.

These organizations of physicians are concerned with an adverse host response, which is manifested as disease. Such responses develop in certain susceptible individuals after prolonged or excessive environmental exposure to foods, dust, pollens, moulds, fungi, yeasts, bacteria, viruses, epidermals, chemicals, hormones, physical (heat, cold, humidity) and psychological stresses.

Individuals of all ages are becoming increasingly susceptible to offending agents found in foods, clothing, drugs, air, water, and in their home, work and play environments. Adverse reactions to these exposures can affect any part of the body and are commonly unrecognized as the cause of many illnesses. Environmentally ill individuals often have polysomatic complaints. The *Thomson Report* of 1985,[1] described these patients as suffering from Polysystem Symptom Complex, defined as a group of symptoms involving at least two systems in the body, usually one of which is the central nervous system, and for which there is, at present, no physical or biochemical explanation.

The basic theories of environmental medicine are the total load concept,[2] individual susceptibility and adaptation.[3-4]

The total load concept describes the simultaneous effect of multiple environmental exposures on the susceptible individual, all of which contribute to the breakdown of the body's homeostatic mechanisms. Rarely is there only one offending agent responsible for triggering or exacerbating environmental hypersensitivity.

Individuals are susceptible to environmental incitants for a variety of reasons, including genetic predisposition, digestive malfunction, inadequate emotional milieu, and immunological and non-immunological injury caused by viruses, chemicals and microbiological toxins.

If the combined effects of the total environmental exposures on the susceptible individual exceeds the ability of that individual to adapt, environmental illness ensues.

The basic concepts and techniques of environmental medicine are complementary to the practice of all branches of medicine. The environmental approach of systematically assessing cause and effect relationships between environmental exposures and chronic illness has resulted in improved well-being and reduced need for drugs to suppress symptoms. This approach also affords patients an

opportunity for greater self-control over their health. Overall, this comprehensive approach is both cost-effective and cost-preventive.[5-6]

1. DIAGNOSTIC TECHNIQUES

A. General

A very detailed clinical and environmental history is fundamental, and it is augmented with physical examination and up-to-date standard laboratory evaluations to rule out other illnesses. The establishment of the diagnosis of environmental hypersensitivity syndrome is based on the elimination and challenge trial. The following test techniques, however, are used to help identify individual allergens.

B. Diagnostic Techniques for Particulate Inhalant Sensitivities

1) SERIAL DILUTION ENDPOINT TITRATION (SDET)[7]

Antigens are serial diluted in 1:5 weight by volume concentrations.

A specific amount of a dilution of test antigen is injected intradermally to form a measured wheal, which is observed for significant growth. When increasing concentrations of antigen are applied, a progressive whealing response is produced.

The results of this test may determine the optimal starting dilution for treatment.[8-12]

2) CLINICAL BIO-ASSAY (PROVOCATION/ NEUTRALIZATION)[13]

A specific amount of a dilution of test antigen is injected intradermally, subcutaneously, or applied sublingually, and the patient's clinical status is observed. If signs and/or symptoms are provoked, neutralization is achieved with a specific dilution. This dilution usually corresponds closely

with the objective SDET findings.

The results of these two tests determine the optimal beginning treatment dilution. Treatment doses can be administered subcutaneously or sublingually.

3) RADIO-ALLERGO-SORBENT TEST (RAST)[14]

This in vitro test is of limited diagnostic value because it is IgE specific only. IgG RAST is available in the United States.

4) PRICK AND SCRATCH TESTS[15]

These tests may be used to screen for IgE-mediated sensitivities only. There is not enough information about the degree of clinical sensitivity to determine the optimal treatment dosage.

C. Diagnostic Techniques for Food Sensitivities

1) DIET STUDIES[16]

a) Elimination

Some foods, which are suspect due to the patient's history, as well as known highly antigenic foods, and, in complex cases, all foods, are eliminated for a minimum of five days. The patient's symptoms and signs are observed.

b) Reingestion Challenge[17]

After an optimum five-day elimination period, foods are individually ingested, and the patient's symptoms and signs are observed.

c) Rotary Diversified Diet[18-19]

An individual diet plan is devised for each patient, whereby available foods are assigned to different days (Day 1, Day 2, etc), and are consumed only on those days. For

example, milk may be assigned to Day 1 of the diet plan. It can be eaten once that day, but on no other day until the plan is completed (usually 4-7 days). The patient's symptoms and signs may be observed on each day of the diet plan to determine if foods on that day, or possibly the day before, are offenders.

All the above diets are monitored by the physician to ensure proper interpretation and adequate nutrition.

2) SERIAL DILUTION ENDPOINT TITRATION (SDET)[20-21]
[*See B, 1)*]

3) CLINICAL BIO-ASSAY (PROVOCATION/ NEUTRALIZATION)[22-27]
[*See B, 2)*]

D. Diagnostic Techniques for Chemical Sensitivities[28]

1) GENERAL

Concentrations of test dilutions are no greater than accepted levels which are encountered in everyday exposures.

a) Clinical Bio-assay Test (Provocation/Neutralization)
This is presently the most commonly used test to diagnose chemical hypersensitivity.

b) Inhalation Challenge Test
This test is performed in specially constructed booths with ecologically clean, odourless and inert materials. Patients are exposed to measured amounts of individual chemicals in a single- or double-blind fashion. The total clinical responses are evaluated with particular attention to central nervous system symptoms and signs.

Neutralization may also be applied to confirm clinical responses to inhalation testing, as well as to relieve provoked symptoms.

E. Comprehensive Environmental Control Unit Studies[29]

Environmental pollutants and other exogenous exposures capable of producing symptoms in susceptible persons are markedly reduced in a comprehensive environmental control unit. It is possible to relieve symptoms after several days in many patients with idiopathic illness by placing them on a total elimination diet, allowing only tolerated water in an environment free of chemicals and particulate inhalants. This suggests that foods and/or environmental substances are major factors in these patients' illnesses.

Once patients are relatively symptom-free, the previously described tests are used to identify the specific causative allergens. Single food ingestion challenges are carried out at first with less chemically contaminated foods because chemical contaminants in or on the foods sometimes cause reactions.

During hospital evaluations, immunological, physiological and psychological parameters are monitored. Comprehensive environmental control hospital studies have been refined over the past 25 years in the U.S. This hospital program is reserved for challenging complex medical problems or patients with life-threatening symptomaology, which does not respond to traditional treatment. At present, this kind of controlled hospital care is not available in Canada.

2. NEW INSIGHTS INTO IMMUNE RESPONSES TO THE ENVIRONMENT

Intolerance of certain foods and chemicals in our environment causes acute and chronic symptoms.[30] These sensitivities may not be mediated by the same system that causes allergic reactions to pollens, dust, animal dander and moulds.

Many concepts of allergy and immune response have changed in the past 10 years. The common consideration of IgG only as a blocking ("good") antibody in allergy, and IgE only as a symptom inducing ("bad") antibody, is obsolete.[31-32] This oversimplified scenario is too incomplete to fully explain accumulated data of complicated interactions among humoral and cellular reactants and the two cell types (helpers and suppressors) that can affect opposite reactions.[33-34] For example, IgG can form immune complexes to produce harmful allergic syndromes, as well as lethal diseases.[35] Conversely, IgE can induce local histamine release, which itself can quickly turn off allergic symptoms and stimulate expansion of clones of protective suppressor lymphocytes.[36-37]

Immune system dysregulation (ISD) can develop over a long period of time or very rapidly. ISD can be triggered by a serious viral infection, major stress, toxic chemical exposure or fungus infection (particularly candida albicans). It is more likely to occur in genetically predisposed individuals.

Toxic chemicals and pollutants adversely affect the biological detoxification systems; columnar epithelial cells, fibroblasts and inflammatory cells are the first barriers encountered. Several metabolic alterations follow the creation of free radicals, which damage the microsomal membrane depleting ATP. Lipid, glucose and protein metabolism are altered. Detoxifying enzyme systems like the

monoamine oxydase, chromium p-450, glucose 6-phosphate dehydrogenase, trypsin and chymotrypsin systems are damaged. Also, the sulfhydryl system is altered. After severe or prolonged stimulation, these systems will become depleted. These systems are frequently catalyzed by vitamins and minerals, which may also be depleted by pollutants. Once these systems fail to detoxify pollutants, more immune dysregulation may occur.[38]

The noxious substances retrograde up the peripheral nerve afferent slow C and rapid A-delta fibres to the dorsal root ganglion. Substance P and somatostatin are released. Substance P will cause local vasodilation and vessel leak, chemotaxis occurs and leukotrienes are released, and non-IgE histamines are triggered. Somatostatin generally attempts to counteract substance P by dampening the nerve impulse.[39-41] This may explain the increased incidence of peripheral neuropathy in people exposed to levels of solvents generally regarded as safe.[42-43]

T cells may also be affected.[44] When the T cells are reduced in number or when their function is impaired, they cannot control B cell antibody production. Without T cell control the B cells cannot distinguish harmless dust pollen, animal dander or nutritious foods from toxic chemicals or life-threatening bacteria or virus.

The immune system's response to antigen exposure is not affected in a linear response to dosage but rather in a biphasic manner.[45-47] Low dosage antigen exposure has a suppressing effect on the immune system due to the modulatory effects of T-suppressor cells.[48-49] Therefore, there is no tolerance to antigen unless specific T-suppressor cells dominate T-helper cells. This is also because different levels of histamine are secreted according to different levels of antigen exposure. Studies indicate that low levels of histamine activate T-suppressor cells.[50]

Macrophages also participate in the initiation and regulation of immune responses[51] by secreting humoral

factors, some with helper and some with suppressor functions.[52-53] These substances are antigen specific and genetically controlled. For example, macrophages can secrete specific suppressor and helper factors for ovalbumin, as can ovalbumin-sensitive suppressor and helper T cells.

Allergy symptoms are mediated by the formation of specific antigen-induced immune complexes rather than by specific antibodies. Symptoms of non-IgE-mediated allergy may be produced in some patients by antigen-induced immune complexes, and relieved by antigen injections, which induces rapid clearing of these complexes.

Immune complex-mediated disease can be associated with symptoms in virtually any organ. A classic example is systemic lupus erythematosis.

In allergic patients, antigens combined with circulating and cell-fixed antibodies, produce anaphylatoxin-mediated histamine release, resulting in increased capillary permeability which causes allergic symptoms. Papers by Brostoff et al[54-55] and Paganelli[56] confirm the existence in food-allergic patients of circulating immune complexes composed of food antigen and a variety of immunoglobulins, including IgG, IgA and IgE. Matthews and Soothill,[57] and Atherton[58] have demonstrated complement activation secondary to immune complex formation in food allergic patients undergoing food challenges with allergenic foods. Minor, Tolber and Frick[59] also found that immune complexes participate in delayed food allergy. Similarly, May[60] has demonstrated chronic high background blood levels of histamine in food-allergic patients.

The symptoms in some patients with non-IgE-mediated allergy can be caused by transient showers of antigen antibody complexes: 1) initiating partial complement activation, 2) inducing anaphylatoxin formation, 3) leading to release of histamine and other mediators from mast cells and basophils, and 4) resulting in allergic edema. The presence, severity and duration of symptoms is, in part, a

function of the level, size, persistence and type of such complexes.[61]

Provocation and neutralization of symptoms may result from alterations in blood and tissue levels of pathogenic complexes.[62] Circulating monocytes and fixed macrophages are important participants in these reactions through the removal of immune complexes.[63-64]

3. NEUTRALIZATION THERAPY

Neutralization therapy by subcutaneous or sublingual application brings rapid relief and increases tolerance to the antigen ("hyposensitization") over weeks, months and years. Rocklin et al[65] and Evans et al[66] have demonstrated that antigen specific suppressor T cells are induced by repeated injections of antigen. Decreased suppressor activity leads to clinical allergic sensitivity. Stimulation of suppressor activity and suppressor T cells is responsible for much of the long-term improvement in allergic patients in immunotherapy.

Symptoms of allergy can be caused by histamine released from mast cells and basophils by both IgE- and non-IgE-mediated mechanisms. These symptoms can be relieved quickly by injecting antigen, which releases the precise amount of histamine to suppress further histamine release. Maintenance treatment with these extracts repeatedly stimulates suppressor T cells to release a histamine-induced suppressor factor (HSF). This suppresses specific antibody production, restoring the health of environmentally ill patients.

The size of immune complexes is extremely important. Very small immune complexes do not trigger complement, but pass easily out of the circulation where they are removed. Very large immune complexes are efficiently cleared by macrophages and other cells of the reticulo-endothelial system. However, intermediate-sized immune complexes, with an antigen antibody ratio of approximately 3:2, persist in the circulation and become lodged in blood vessel endothelium, triggering activation of the complement cascade.[67]

Antigens and antibodies in complexes can quickly dissociate and recombine in other ratios. Complement activation and inactivation can occur in seconds or minutes.

The addition of a small amount of antigen or antibody can shift the reaction markedly.[62] Neutralization has an effect on histamine release,[10] the levels of which have a significant role to play in balancing T-helper/ suppressor activity.[68] Intradermal neutralization also has an effect on macrophages in the skin, which may favourably alter the antigen antibody ratio in the immune complexes.[69]

In vitro studies of neutralization therapy demonstrate that basophils, incubated with low-dose antigen, do not release histamine on exposure to higher doses of antigen,[70] suggesting a mechanism blocking the release of histamine.

4. PSYCHONEUROIMMUNOLOGY

Psychoneuroimmunology is a field of research which deals with the relationship between the central nervous system and the immune system. There are many studies which demonstrate the effects of psychological stress on the immune system,[71] and there are also studies which demonstrate the effects of the immune system on the limbic system. Particularly, it has been demonstrated that antibody response triggers a stress response in the hypothalamus, that is, neuron firing and norepinephrine release in several hypothalamic nuclei.[72] It is postulated that the stress response in the hypothalamus is triggered by the release of peptides by lymphocytes in the periphery. The highest concentration of receptor sites for peptides is located in the limbic system.[73]

There are also many studies which demonstrate that immune system responses can be conditioned, for example, histamine release, antibody production and anaphylaxis.[71] Deconditioning of the immune system may help to explain why continuous neutralization therapy over many months contributes to desensitization, despite the fact that antibody levels to the antigens in the environment are not significantly altered.

5. THERAPEUTIC TECHNIQUES

A. Elimination

Allergens should be removed when appropriate.

B. Neutralization

Neutralization therapy should be applied when elimination therapy is not sufficient to maintain optimal health.

6. RESEARCH STUDIES SUPPORTING THERAPEUTIC TECHNIQUES

A. Particulate Inhalants

Allergy reaction to particulate inhalants such as dust, moulds and pollens is a well-accepted phenomenon. Intradermal testing using serial dilution endpoint titration provides precise starting dosages for neutralization therapy by subcutaneous or sublingual routes. This can bring rapid relief within minutes and gradually increases tolerance to the antigen over weeks, months and years, even after neutralization therapy is discontinued. There are eight statistically significant studies supporting this observation.[8-12,21 22,25]

B. Foods

Food allergies and hypersensitivity reactions are mediated by all mechanisms described by Gel and Coombs. There are 39 statistically significant studies supporting the fact that food allergy and hypersensitivity contribute to the development of polysomatic complaints.[23,26,74-110]

C. Flora

The microbial flora of the human body consist of a balance of bacteria, yeast and viruses. Many factors can upset this balance such as chronic viral infection, excessive sugar and carbohydrate intake, frequent or prolonged use of antibiotics, corticosteroids and exogenous hormones such as the birth control pill. In particular, overgrowth of yeast (candida albicans) or fungus (trichophyton, epidermophyton) can contribute to dysregulation of the immune system. This is possibly because of an immunological response, the release of toxins[111] or the disruption of the membrane activity of the intestinal wall, leading to increased absorption of intermediate-sized immune complexes. Chronic Epstein-Barr virus infection may also play a significant role. There are 11 studies supporting the observations of clinical ecologists regarding candida hypersensitivity.[112-122] Further research is required to clarify this problem.

D. Chemical Pollutants

The U.S. Environmental Protection Agency estimates that there have been 60,000 different new chemicals introduced into the environment since the 1940s. (*See Table 1, p25.*) Insecticides and pesticides are added to our foods and water; industrial wastes are added to our air and water. We have increased contact with indoor pollutants from a wide variety of sources such as construction materials (particle board, tar, glue, paint, plywood, etc.), synthetics, fabrics, cleaners, disinfectants, cigarette smoke and perfume. Most of these chemicals are fat soluble and are stored in the body, mainly in fat and lipids.

Technology is now commercially available to accurately quantify the levels of chemical pollutants in the human body. Random population sampling indicates that measurable amounts of insecticide, pesticide, solvents and other chemical pollutants are regularly found in the general North American population.[123] These chemicals could have an antoxidant effect as discussed previously or contribute to immune system dysfunction by altering T cell helper-suppressor ratios.[44]

Finally, there are 37 studies which support the fact that chronic low-dose exposure to chemical pollutants can

contribute to central nervous system and immune system dysfunction.[124-160] There are 21 scientific studies which demonstrate that chronic exposure to low levels of environmental pollutants, previously thought to be under the maximum safe levels, can cause neurophysiological and neurobehavioural abnormalities, which may or may not be reversible.[140-160] These studies are accepted and this view is held by the United States Center for Disease Control (Atlanta), Department of Health.[161] They are also accepted and supported by the World Health Organization, which has recently developed standardized categories to describe the effects of chronic chemical exposure on the central nervous system.[162]

7. SUMMARY

Most of the patients that are referred to a clinical ecologist's office for evaluation suffer from multiple somatic complaints. Often, no diagnosis has been established by conventional medical practice. Differential diagnoses of these patients includes anxiety, depression, somatization disorder, postviral neurasthenia and environmental hypersensitivity syndrome.

Patients who suffer from simple anxiety or depression should respond to psychotherapeutic intervention. Failure of this treatment should give the practising physician cause to reevaluate these diagnoses. Somatization disorder describes a patient with at least 13 physical complaints which cannot be explained.[163] Although these patients are considered to be psychiatrically ill, there is no psychological explanation or effective psychotherapeutic treatment for them. By using standard blood test analysis, patients suffering from postviral neurasthenia should be able to demonstrate the exacerbation of symptoms associated with evidence of recent exposure to virus.[164] Patients with multiple somatic complaints, who do not respond to conventional medical therapy and/or have no proven established diagnosis, should be investigated for environmental hypersensitivity syndrome.

The testing techniques of clinical ecologists are useful as screening tools to establish which factors in the environment may be contributing to illness. The observations made by clinical ecologists regarding the success of the diagnostic and treatment techniques used, are well-supported by the scientific literature reviewed in this paper. The Thomson Committee recommended acceptance of serial dilution endpoint titration as a valid test technique.[165] In 1987, the American Medical Association also acknowledged the validity of serial dilution endpoint titration as a reliable test technique.[166-167]

Clinical ecologists are licensed medical doctors especially qualified in the field of environmental medicine. As physicians, they have been found to be conscientious and careful in their approach, spending longer than average periods of time at each appointment, and placing heavy emphasis on patients' history.[168] This individualized approach to chronic human illness—to remove the underlying cause of the disease—is cost-effective and cost-preventive in nature.[5-6]

Clinical ecologists do not deny that their patients are suffering from chronic stress. However, they argue that a significant amount of the stress may be immunological, chemical and physical, rather than purely psychological. This theoretical position is strongly supported by well-accepted immunological and psychoneuroimmunological concepts as described above.

It should be noted that predominant current medical opinion regards the concepts of clinical ecology as "unproven." These opinions are based on approximately 14 negative studies published over the last 17 years.[169-182] Many were reported as abstracts only[169,170,174,177] and the others have been criticized for being poorly designed and inconclusive.[183-185] It is the opinion of The Canadian Society for Clinical Ecology and Environmental Medicine that there is no sound scientific evidence to disprove the concepts of clinical ecology.

The theory that patients with polysystem symptom complex suffer only from psychological illness is reductionist in nature. In 1985, in the *Canadian Medical Association Journal*, Stewart[180] evaluated 18 treatment failures of clinical ecologists, and concluded that these patients suffered from primary psychiatric illness. This paper is observational only because it was not double-blinded or controlled. Furthermore, seven out of the eighteen patients received a diagnosis of somatization disorder. Because only treatment failures were evaluated, it is illogical to conclude

that environmental hypersensitivity does not exist and that all patients diagnosed by clinical ecologists suffer from psychiatric illness.

Stewart's paper, which is widely quoted by Canadian physicians, also claims that there is no sound scientific literature to support the claim that chemicals in the environment can provoke central nervous system abnormalities, in particular, psychological symptoms. The research reviewed here strongly refutes this statement. In fact, the observation that chronic central nervous system changes can be caused by chronic repeated exposure to "safe" levels of chemicals in the environment, is strongly supported by the Center for Disease Control (Atlanta) in the United States,[161] and the World Health Organization.[162]

8. RECOMMENDATIONS

A. Research

1) Epidemiological studies are needed to establish the prevalence of this syndrome in our society.
2) Biological markers to identify environmentally ill patients need to be established.
3) Patients at risk need to be identified.
4) Methods to reduce the amount of chemical exposure in the environment need to be established.
5) An environmental control unit must be established to allow strict control of the environment to facilitate research.

B. Medical Education

1) The concepts of clinical ecology and environmental medicine should be included in CME programs and medical education conferences.
2) The concepts of clinical ecology should be part of the medical school curriculum.

C. Public Education

1) Principles of environmental health should be taught in the public education system.
2) The value of less chemically contaminated foods and water, and the principles of organic agricultural methods, should be promoted.
3) Safer building materials and proper ventilation and heating systems to reduce indoor air pollution should be implemented with adherence to stricter guidelines by architects and engineers.

4) Safe alternative methods for weed and pest control must be developed and promoted for use.

D. Financial Support

Diagnostic and therapeutic techniques should be paid for by third party insurance.

E. The Thomson Report

The recommendations of the *Thomson Report* should be implemented.

F. Environmental Control

1) The establishment of stricter indoor and outdoor environmental regulatory guidelines are needed.
2) The fact that chronic exposure to "safe" levels of chemical pollutants in the environment can contribute to central nervous system and immune system dysfunction should be accepted.

G. Provincial Medical Associations

1) Clinical ecology subsections should be established in provincial medical associations.
2) A more active role should be assumed by the medical profession to inform the government and the public of the contribution of pollution to the development of disease.

H. Acceptance

The following should be accepted:

1) The existence of environmental hypersensitivity syndrome.

2) The validity of the serial dilution endpoint titration and provocation/neutralization test techniques.

3) The effectiveness of the above treatment techniques.

4) The recognition that stress can be immunologically mediated by the environment.

We must learn how to live in harmony with our environment according to the laws of nature rather than continue to disrupt the biological balance.

TABLE 1

USE OF CHEMICALS IN NORTH AMERICA

Chemicals in commercial use	60,000 to 100,000
New chemicals produced annually	1,000
Chemicals on the U.S. Environmental Protection Agency's 1978 Toxic Effects List	34,000
Toxic substances in the workplace	15,000
Suspected carcinogens in the workplace	1,500
Departments and agencies involved in occupational health and safety issues in Canada	90
Provincial and federal laws concerning occupational health and safety in Canada	220
Sets of regulations under these laws	400+
Metro Toronto industrial workplaces to be inspected	25,000
Occupational health and safety inspectors for Metro Toronto	25
Drug products on sale in Canada	15,000
Drug substances licensed in Canada	200+
Flavours permitted to be added to foods in Canada	1,500
Flavours permitted to be added to cigarettes in Canada	1,000+
Food additives permitted in Canada	330
Pesticide residues permitted to be on foods in Canada	103
Food colours permitted in Canada	32
Pesticides used in North America	1,400
Varieties of pesticides sold in North America	30,000
Chemicals, mainly pesticides, whose safety is uncertain due to fraudulent testing by IBT	100
Tonnes of industrial wastes generated annually in Canada (1 million tonnes of this waste is toxic)	32 million
Gallons of liquid industrial wastes generated annually in Ontario (8-16 million gallons of this are hazardous)	80 million
Hazardous materials incidents (spills, explosions, fire and leaks) in the City of Toronto in 1980	120
Organic compounds found in the Great Lakes ecosystem	400
Contaminants in herring gull eggs in Lake Ontario	300+
Organic compounds in U.S. drinking water	250+
Toxic chemicals found in Lake Ontario water	200

Source: Health Advocacy Unit, Toronto Department of Health, 1981

ENDNOTES

1. Thomson, G.M., *Report of Ad Hoc Committee on Environmental Hypersensitivity Disorders* (Government of Ontario: Ministry of Health, August 1985), p 17-18.
2. Bell, I.R., *Clinical Ecology: A New Medical Approach to Environmental Illness* (Bolinas, California: Common Knowledge Press, 1982), p 16.
3. Randolph, T.G., "Specific Adaptation," *Annals of Allergy*, 40 (1978): 333-345.
4. Hackney, J.D., et al. "Studies in Adaptation to Ambient Oxidant Air Pollution: Effects of Ozone Exposure in Los Angeles Residents vs. New Arrivals," *Environmental Health Perspective*, 18 (1976): 141-146.
5. Krop, J., "Clinical Ecology - Future Prospects of Preventive Medicine," *Journal of Orthomolecular Medicine*, 1 (1986): 5-12.
6. Rea, W., et al. "Recurrent Environmentally Triggered Thrombophlebitis - A Five-year Follow-up," *Annals of Allergy*, 47 (Nov. 1981): 338-344.
7. Rinkel, H.J., "Inhalant Allergy, Part 1: The Whealing Response of the Skin to Serial Dilution Testing," *Annals of Allergy*, 7 (1949): 625-630, 650.
8. Boris, M., et al. "Antigen-induced Asthma Attenuated by Neutralization Therapy: A Double-blind Study," *Journal of Clinical Ecology*, 3,2 (Summer 1985): 59-62.
9. Boris, M., et al. "Late Phase Response Treated with Neutralization Therapy," presented to the 21st Scientific Session of the American Academy of Environmental Medicine, October 31, 1987, Nashville, Tennessee.
10. Brostoff, J., "A Double-blind Crossover Placebo-controlled Study of Neutralization," presented to the 20th Advanced Seminar of the American Academy of Environmental Medicine, October 27, 1986, Clearwater, Florida.
11. Scadding, G.K., et al. "Low Dose Sublingual Therapy in Patients with Allergic Rhinitis due to House Dust Mites," *Clinical Allergy*, 16 (1986): 483-491.
12. Lee, L.K., et al. "Aggressive Coseasonal Immunotherapy in Mountain Cedar Pollen Allergy," *Archives of Otolaryngology* (Dec. 1982).

13. Miller, J.B., *Food Allergy: Provocative Testing and Injection Therapy* (Springfield, Illinois: Charles C. Thomas, 1972).
14. Wide, L., et al. "Diagnosis of Allergy by an In Vitro Test for Allergen Antibodies," *Lancet*, 2 (1967): 1105.
15. Lawlor, G.J.; Fischer, T.J. (Editor), *Manual of Allergy and Immunology: Diagnosis and Therapy* (Boston, Massachussetts: Little, Brown & Company, 1982), p 28-29.
16. Dickey, L.D. (Editor), *Clinical Ecology* (Springfield, Illinois: Charles C. Thomas, 1976).
17. Rowe, A.H.; Rowe, A. Jr., *Food Allergy: Its Manifestations and Control and the Elimination Diets—A Compendium* (Springfield, Illinois: Charles C. Thomas, 1972).
18. Rinkel, H.J.; Randolph, T.G.; Zeller, M., *Food Allergy* (Springfield, Illinois: Charles C. Thomas, 1951).
19. Rinkel, H.J., "Food Allergy IV—The Function and Clinical Application of the Rotary Diversified Diet," *Journal of Pediatrics*, 32 (1948): 266.
20. Lee, C.H., et al. "The Diagnosis of Food Allergy," *Archives of Otolaryngology*, 79 (1964): 71.
21. Lee, C. H., "A New Test for the Detection of Food Allergies and Pollen and Mould Incompatibilities," *Trans Soc Ophthalmol Otolaryngol Allergy*, 3, 1 (1962).
22. Miller, J.B., "A Double-blind Study of Food Extract Injection Therapy: A Preliminary Report," *Annals of Allergy*, 38 (March 1977): 185-191.
23. Rea, W.J., et al. "Elimination of Oral Food Challenge Reaction by Injection of Food Extracts: A Double-blind Evaluation," *Archives of Otolaryngology*, 110 (April 1984): 248-252.
24. Rapp, D.J., "Food Allergy Treatment for Hyperkinesis," *Journal of Learning Disabilities*, 12, 9 (1979): 42-50.
25. O'Shea, J.A., et al. "Double-blind Study of Children with Hyperkinetic Syndrome Treated with Multi-allergen Extract Sublingually," *Journal of Learning Disabilities*, 14, 4 (April 1981): 189-192.
26. Lee, C.H., et al. "Provocative Testing and Treatment for Foods," *Archives of Otolaryngology*, 90 (1969): 113-120.
27. Rinkel, H.J., et al. "The Diagnosis of Food Allergy," *Archives of Otolaryngology*, 79 (1964): 71-79.
28. Randolph, T.G., "Ecological Orientation in Medicine: Comprehensive Environmental Control in Diagnosis and Therapy," *Annals of Allergy*, 23 (1965): 7-22.

29. Edgar, R.T., et al. "Air Pollution Analysis Used in Operating an Environmental Control Unit," *Annals of Allergy*, 42 (1979): 166-173.
30. Randolph, T.G., *Human Ecology and Susceptibility to the Chemical Environment* (Springfield, Illinois: Charles C. Thomas, 1962).
31. Keneny, D.N., et al. "Subclass of IgG in Allergic Disease: IgG Subclass Antibodies in Immediate and Non-immediate Food Allergy," *Clinical Allergy*, 16 (1986): 571-581.
32. Halpern, G.M., et al. "Non-IgE-mediated Mechanism in Food Allergy," *Journal of Allergy*, 58 (1987): 14-27.
33. Herscowitz, H.B.; Pennline, K.J.; Conrad, R.E.; Ulrich, S.E.; Gerber, H.R., "Macrophage-lymphocyte Interactions Mediated by Soluble Factors," *Annals of the New York Academy of Sciences*, 332 (1979): 464-481.
34. Farrar, J.F.; Simon, P.L.; Farrar, W.L.; Koopman, W.J.; Fuller-Bonnar, J., "Role of Mitogenic Factor, Lymphocyte-activating Factor and Immune Interferon in the Induction of Humoral and Cell-mediated Immunity," *Annals of the New York Academy of Sciences*, 332 (Dec. 1979): 303-315.
35. Brostoff, J.; Johns, P.; Stanworth, D.R., "Complexed IgE in Atopy," *Lancet*, 2 (1977): 741-742.
36. Majno, G.; Palade, G.E.; Schoefl, G.I., "Studies on Inflammation II: The Site of Action of Histamine and Serotonin along the Vascular Tree—A Topographic Study," *Journal of Biophysical and Biochemical Cytology*, 2 (1961): 607.
37. Rocklin, R.E.; Sheffer, A.L.; Greinedeker, D.K.; Melmon, K.L., "Generation of Antigen-specific Suppressor Cells during Allergy Desensitization," *New England Journal of Medicine*, 302 (1976): 1378-1385.
38. Mustafa, M.G.; Hacker, A.D.; Ospital, J.J.; Hussain, M.Z.; Lee, S.D. (Ed.), *Biochemical Effects of Environmental Pollutants* (Michigan: Ann Arbor Science Publishers, 1977).
39. Evans, M.J.; Calbral, L.J.; Stephens, R.J.; Freeman, G., "Renewal of Alveolar Epithelium in the Rat following Exposures to Nitrogen Dioxide," *American Journal of Pathology*, 70 (1973): 175.
40. Adamson, I.Y.R.; Bowden, D.H., "The Type II Cell as Progenitor of Alveolar Epithelial Regeneration: A Cytodynamic Study on Mice after Exposure to Oxygen," *Laboratory Investigations*, 30 (1974): 35.

41. Evans, M.J.; Cabral, L.J.; Stephens, R.J.; Freeman, G., "Transformation of Alveolar Type II Cells/Type I Cells following Exposure to Nitrogen Dioxide," *Exp. Mol Path*, 22 (1975): 142.
42. Seppalainen, A.M., et al. "Neurophysiological and Psychological Picture of Solvent Poisoning," *American Journal of Industrial Medicine*, 1 (1980): 31-42.
43. Knave, B., et al. "Long-term Exposure to Jet Fuel II: A Cross-sectional Epidemiological Investigation on Occupationally Exposed Industrial Workers with Special Reference to the Nervous System," *Scandinavian Journal of Work, Environment and Health*, 4 (1978): 19-45.
44. Rea, W.J., et al. "T & B Lymphocyte Parameters in Chemically Sensitive Patients and Controls," *Journal of Clinical Ecology*, 3, 2 (1985): 85-94.
45. Mitchison, N.A., "The Dosage Requirements for Immunological Paralysis by Soluble Proteins," *Journal of Immunology*, 15 (1968): 509.
46. Boggs, J.M., et al. "Immune Lysis of Reconstituted Myelin Basic Protein-Lipid Vesicles and Myelin Vesicles," *Journal of Immunology* (1983): 1687-1694.
47. Eichmann, K., "Idiotype Suppression," *European Journal of Immunology*, 4 (1974): 296-302.
48. Zembala, M.A., et al. "Anti-haptene T-suppressor Factor Acts through an I-J+, Lyl-2+, T-acceptor Cell that Releases a Non-specific Inhibitor of the Transfer of Contact Sensitivity when Exposed to Antigen," *Journal of Immunology*, 129 (1982): 1823-1829.
49. Thomas, D.W., et al. "Regulation of the Immune Response: Production of a Soluble Suppressor by Immune Spleen Cells In Vitro," *Journal of Immunology*, 114 (1975): 1616-1622.
50. Szewczk, M.R., et al. "Evidence of Histamine-induced Auto/Anti-idiotypic Antibody Immunoregulation In Vivo," *Cellular Immunology*, 65 (1981): 152-165.
51. Mizel, S.B., "Biochemical and Biological Characterization of Lymphocyte-activating Factor (LAF) Produced by the Murine Macrophage Cell Line P 388DI," *Annals of the New York Academy of Sciences*, 332 (1980): 539-549.
52. Herscowitz, H.B.; Pennline, K.J.; Conrad, R.E.; Ulrich, S.E.; Gerber, H.R., "Macrophage-Lymphocyte Interactions Mediated by Soluble Factors," *Annals of the New York Academy of Sciences*, 81 (1979): 332-464.

53. Erb, P.; Feldman, M., "The Role of Macrophages in the Generation of T-helper Cells I: The Requirement of Macrophages in Helper Cell Induction and Characteristics of the Macrophage T-cell Interaction," *Cellular Immunology*, 19 (1975): 356-357.
54. Brostoff, J.; Johns, P.; Stanworth, D.R., "Complexed IgE in Atopy," *Lancet*, 2 (1977): 741-742.
55. Brostoff, J.; Carini, C.; Wraith, D.G.; Johns, P., "Production of IgE Complexes by Allergen Challenge in Atopic Patients and the Effect of Sodium Cromoglycate," *Lancet* (1979): 1268-1270.
56. Paganelli, R.; Levinsky, F.J.; Brostoff, J.; Wraith, D.G., "Immune Complexes Containing Food Proteins in Normal and Atopic Subjects after Oral Challenge and the Effect of Sodium Cromoglycate on Antigen Absorption," *Lancet* (1979): 1270-1271.
57. Matthews, T.S.; Soothill J.F., "Complement Activation after Milk Feeding in Children with Cow's Milk Allergy," *Lancet*, 2 (1970): 893.
58. Atherton, D.J.; Sewell, M.; Soothill, J.F.; Wells, R.S., "A Double-blind Controlled Crossover Trial of an Antigen-avoidance Diet in Atopic Eczema," *Lancet*, 1 (1978): 401.
59. Minor, J.D.; Tolber, S.G.; Frick, O.L., "Leukocyte Inhibition Factor in Delayed-onset Food Allergy," *Journal of Allergy and Clinical Immunology*, 66, 4 (1980): 314-321.
60. May, C.D., "High Spontaneous Histamine Release In Vitro from Leukocytes of Persons Hypersensitive to Food," *Journal of Allergy and Clinical Immunology*, 58 (1976): 432.
61. Kohler, P.F., "Immune Complexes and Immune Disease," Middleton, E. Jr.; Reed, C.E.; Ellis, E.F. (Eds.), *Allergy: Principles and Practice* (St. Louis: C.V. Mosby Company, Vol.1, 1978).
62. McGovern, J.J. Jr.; Lazaroni, J.L.; Saifer, P.; Levin, A.S.; Rapp, D.J.; Gardner, R.W., "Clinical Evaluation of the Major Plasma and Cellular Measures of Immunity," *Journal of Orthomolecular Psychiatry*, 12, 1 (1983): 12.
63. Weigle, W.O.; Dixon, F.J., "Relationship of Circulating Antigen-antibody Complexes, Antigen Elimination and Complement Fixation in Serum Sickness," *Proceeding of the Society of Experimental Biology and Medicine*, 99 (1958): 226.

64. Dixon F.J.; Vasquez, D.J.; Weigly, W.O.; Cochran, C.C., "Immunology and Pathogenesis of Experimental Serum Sickness," Lawrence, H.S. (Ed.), *Cellular and Humoral Aspects of Hypersensitive States* (New York: Hoeber-Harper, 1959).
65. Rocklin, R.E.; Sheffer, A.L.; Greinedeker, D.K.; Melmon, K.L., "Generation of Antigen-specific Suppressor Cells during Allergy Desensitization," *New England Journal of Medicine*, 302 (1976): 1378-1385.
66. Evans R.; Pence, H.; Kaplan, H.; Rocklin, R.E., "The Effect of Immunotherapy on Humoral and Cellular Responses in Ragweed Hayfever," *Clinical Investigation*, 57, 5 (May 1976): 1378-1385.
67. Kohler, P.F., "Immune Complexes and Immune Disease," Middleton, E. Jr.; Reed, C.E.; Ellis, E.F. (Eds.), *Allergy: Principles and Practice* (St. Louis: C.V. Mosby Company, Vol.1, 1978).
68. Bourne, H.R., et al. "Histamine Augments Leukocyte Adenosine 3'5'-Monophosphate and Blocks Antigenic Histamine Release," *Science*, 173 (1971): 743-745.
69. Silberberg, I., et al. "The Role of Langermans Cells in Allergic Contact Hypersensitivity: A Review of Findings in Man and Guinea Pigs," *Journal of Investigative Dermatology*, 66 (1976): 210-217.
70. Lichtenstein, L., et al. "Transition from Specific to Non-specific Desensitization," *Journal of Immunology*, 27 (1981): 2410-2414.
71. Ader, R. (Ed.), *Psychoneuroimmunology* (New York, New York: Academic Press, 1981).
72. Besedovsky, H., et al. "The Immune Response Evokes Changes in Brain Noradrenergic Neurons," *Science*, 221 (1983): 564-565.
73. Hill, J.M., "Update: Neuropeptides and Receptors," reported to the 21st Scientific Session of the American Academy of Environmental Medicine, Nashville, Tennessee, October 29, 1987.
74. Atherton, D.J., et al. "A Double-blind Controlled Crossover Trial of an Antigen-avoidance Diet in Atopic Eczema," *Lancet* (Feb.1978).
75. Bernstein, M., "Double-blind Food Challenge in the Diagnosis of Food Sensitivity in the Adult," *Journal of Clinical Immunology*, 54 (1974): 165.

76. Bernstein, M., *Journal of Clinical Immunology*, 70 (Sept. 1982): 205-210.
77. Brostoff, J., et al. "Migraine is a Food Allergic Disease," *Lancet* (Sept. 1984): 719-721.
78. Brown, M., et al. "Food Allergy in Polysymptomatic Patients: A Double-blind Study," Society of Clinical Ecology - Advanced Seminar (Oct. 6, 1981): 44-48.
79. Crayton, J.W., et al. "Epilepsy Precipitated by Food Sensitivity: Report of a Case with Double-blind Placebo-controlled Assessment," *Clinical Electroencephalography*, 12, 4 (1981): 192-198.
80. Egger, J., et al. "Controlled Trial of Oligoantigenic Treatment in the Hyperkinetic Syndrome," *Lancet* (March 1985): 540-545.
81. Finn and Cohen, "Food Allergy - Fact or Fiction," *Lancet* (Feb. 1978).
82. Gerrard, J., "Allergic Rhinitis and Asthma," Double-blind, Placebo-controlled Trial with Immunotherapy based on Lee-Miller Titration, presented to 21st Advanced Seminar, Oct. 31, 1987.
83. Graham, et al. "A Study of Hypo-allergenic Diets in the Management of Atopic Eczema," *British Journal of Dermatology* (1984): 110, 456-457.
84. Hoj, L., et al. "A Double-blind Controlled Trial of Elemental Diet in Severe, Perrenial Asthma," *Annals of Allergy*, 36 (1981): 257-262.
85. Hunter, et al. "Irritable Bowel Syndrome - Food Intolerance a Major Factor in the Pathogenesis of the Irritable Bowel Syndrome," *Lancet* (Nov. 1982).
86. King, D.S., "Can Allergic Exposure Provoke Psychological Symptoms? A Double-blind Study," *Biological Psychiatry*, 16, 1 (1981): 3-19.
87. Levy, F., et al. "Hyperkinesis and Diet: A Double-blind Crossover Trial with a Tartrazine Challenge," *The Medical Journal of Australia*, 1, 2 (Jan. 1978).
88. Mandell, M.; Conte, A., "The Role of Allergy in Arthritis, Rheumatism and Polysymptomatic Cerebral, Visceral and Somatic Disorders: A Double-blind Study," *Journal of the International Academy of Preventive Medicine* (1982): 5-16.
89. Mansfield, L.E., et al. "Food Allergy and Adult Migraine: Double-blind and Medication Confirmation of an Allergic Etiology," *Annals of Allergy* (1985): 55.

90. Matthew, N.T., "Prophylaxis of Migraine and Mixed Headaches - A Randomized, Controlled Study," *Headache*, 21 (May 1981): 105-109.
91. Radcliffe, M., et al. "Food Allergy in Polysymptomatic Patients," *Practitioner*, 225 (Nov. 1981): 1651.
92. Rapp, D.J., "Double-blind Confirmation and Treatment of Milk Sensitivity," *The Medical Journal of Australia*, 1 (May 1978): 571-572.
93. Soothill, J.F., et al. "Is Migraine Food Allergy?" *Lancet* (Oct. 1983).
94. Williams, I.J., "Relative Effects of Drugs and Diet on Hyperactive Behaviour: An Experimental Study," *Pediatrics*, 61 (1978): 811-817.
95. Shaywitz, B.A., "Effects of Chronic Administration of Food Colourings on Activity Levels and Cognitive Performance in Normal and Hyperactive Developing Rat Pups," *Annals of Neurology*, 4 (1978): 196.
96. Weiss, B., "Behavioural Responses to Food Colourings," *Science*, 207 (1980): 1487-1489.
97. Swanson, J.M., "Food Dyes in Pair Performance of Hyperactive Children on a Laboratory Learning Test," *Science*, 207 (1980): 1485-1487.
98. Prinz, R.J., "Dietary Correlates of Hyperactive Behaviour in Children," *Journal of Consult Clinical Psychology*, 48 (1980): 760.
99. Soothill, J.F., "Food Allergy: The Major Cause of Infantile Colitis," *Archives of Disease in Childhood*, 59 (1983): 326-329.
100. Monro, J., "Food Allergy in Migraine," *Proc Nutr Soc*, 42 (1983): 241.
101. Gerrard, J.R., "Just Food Intolerance," *Lancet*, 2 (1984): 413.
102. Finn, R., "A Critical Study of Clinical Ecology," *Practitioner*, 229: 883-885.
103. Finn, R., et al. "Expanding Horizons of Allergy and the Total Allergy Syndrome," *Journal of Clinical Ecology*, 3, 3 (1985): 129, 131.
104. Smith, M.A., et al. "Food Intolerance, Atopy, and Irritable Bowel Syndrome," *Lancet*, 2 (Nov. 1985): 1064.
105. Jenkins, H.R., et al. "Food Allergy: The Major Cause of Infantile Colitis," *Annals of Allergy*, 53 (Oct. 1984).

106. Siegel, J., "Inflammatory Bowel Disease: Another Possible Facet of the Allergic Diathesis," *Annals of Allergy*, 47 (1981): 92-94.
107. Pastorello, E., et al. "Evaluation of Allergic Etiology in Perrenial Rhinitis," *Annals of Allergy*, 55 (1985): 854-856.
108. Jones, V.A., et al. "Crohn's Disease: Maintenance of Remission by Diet," *Lancet*, 37 (July 1985): 177-180.
109. Swain, A., et al. "Salicylates, Oligoantigenic Diets and Behaviour," *Lancet*, 2 (1985): 41-42.
110. Rapp, D.J., "Food Allergy Treatment for Hyperkinesis," *Journal of Learning Disabilities*, 12, 9 (1979): 42-50.
111. Kolata, G., "Steroid Hormone Systems Found in Yeast," *Science*, 225 (Aug. 1987): 913-914.
112. Holti, G., "Candida Allergy," Winnter, H.I.; Hurley, R. (Eds.), *Symposium on Candida Infection* (Edinburgh and London: E.F. Livingstone, 1966), p 74-81.
113. Haggland, H., "Antibody Studies in Patients with Candidiasis," presented to Yeast Interaction Symposium, San Francisco, California, p 29-31.
114. James, J., "An Assessment of the Role of Candida Albicans and Food Yeast in Chronic Urticaria," *British Journal of Dermatology*, 84 (1971): 227-237.
115. Shelley, W.B., "Chronic Urticaria due to Mould Hypersensitivity," *Archives of Dermatology*, 83 (1961): 549.
116. Palacios, H.J., "Hypersensitivity as a Cause of Dermatologic and Vaginal Monoliasis Resistant to Local Therapy," *Virginia Medical Journal* (1977): 393-99.
117. Smith, C.P., "Candidiasis: Pathogenesis, Host Resistance and Predisposing Factors," Boey, G.P.; Fainstein, V. (Eds.),*Candidiasis* (New York: Raven Press, 1985) p 62-65.
118. Petitpierre, M., et al. "Irritable Bowel Syndrome and Hypersensitivity to Flora," *Annals of Allergy*, 54 (1985): 538-540.
119. Appelboom, R.; Flowers, R., "Ketoconazole in the Treatment of Chronic Mucocutaneous Candidiasis Secondary to Autoimmune Polyendocrinopathy-Candidiasis Syndrome," *Cutis*, 30 (1982): 71-72.
120. Arulanantham, K.; Dwyer, J.M.; Genel, M., "Evidence for Defective Immunoregulation in the Syndrome of Familial Candidiasis Endocrinopathy," *New England Journal of Medicine*, 300, 4 (1978): 164-168.

121. Dempsey, A.; DeSwiet, M.; Dewhurst, J., "Premature Ovarian Failure associated with Candida Endocrinopathy Syndrome," *British Journal of Obstetrics and Gynaecology*, 88 (1981): 563-565.
122. Dolen, J.; Varma, S.; South, M.A., "Chronic Mucocutaneous Candidiasis Endocrinopathies," *Cutis*, 27 (1981): 592.
123. Kutz, F.W.; Strassman, S.L.; Sperling, J.F., "Survey of Selected Organochlorine Pesticides in the General Population of the U.S., Fiscal Years 1970-1975," *Annals of the New York Academy of Sciences*, 320 (1979): 60-68.
124. Mikkelsen, S., et al. "Pre-senile Dementia as an Occupational Disease following Industrial Exposure to Organic Solvents: A Literature Survey," *Ugesk Laeg*, 14 (1978): 1633-1638.
125. Arlien-Soberg, P., et al. "Chronic Painter's Syndrome: Chronic Toxic Encephalopathy in House Painters," *Acta Neurol Scand*, 60 (1979): 149-156.
126. Bruhn, P., et al. "Prognosis in Chronic Toxic Encephalopathy: A Two-year Follow-up Study in 26 Painters with Occupational Encephalopathy," *Acta Neurol Scand*, 6 (1981): 259-272.
127. Valcuikas, J.A., et al. "Neurobehavioural Changes among Shipyard Workers Exposed to Solvents," *Archives of Environment and Health*, 40 (1985): 47-52.
128. Lidberg, L., et al. "Violent Crime and Occupational Exposure to Organic Solvents," *Lancet* (Nov. 1987): 1086.
129. Hanninen, H., et al. "Behavioural Effects of Long-term Exposure to a Mixture of Organic Solvents," *Scandinavian Journal of Work, Environment and Health* (1974): 240-255.
130. Baker, E.L., et al. "The Neurotoxicity of Industrial Solvents: A Review of the Literature," *American Journal of Industrial Medicine* (1985): 8207-8218.
131. Savage, E., et al. "Chronic Neurological Sequellae of Acute Organophosphate Pesticide Poisonings: An Epidemiological Study," Final Report, U.S. Environmental Protection Agency, Washington, D.C., 1982.
132. Rea, W.J., "Chemical Sensitivity: A Double-blind Study," in press, 1986.
133. Bertschler, J., "Psychological Components of Environmental Illness: Factor Analysis of Changes during Treatment," *Journal of Clinical Ecology*, 3, 2 (1985): 85-94.

134. Rea, W.J., "Pesticides and Brain Function Changes in a Controlled Environment," *Journal of Clinical Ecology*, 2 (1984): 145-150.
135. Randolph, T.G., "Depressions Caused by Home Exposures to Gas and Combustion Products of Gas, Oil, Coal," *Journal of Laboratory and Clinical Medicine*, 46 (1955): 198-224.
136. Randolph, T.G., "Demonstrable Role of Foods and Environmental Chemicals in Mental Illness," *Japanese Journal of Allergology*, 23 (1974): 445-457.
137. Coffin, D.L., "Effects of Sulphur Dioxide and Sulphate Aerosol Particles on Human Health," *AMBIO*, 5 (1976): 239-242.
138. Spyker, J.M., "Assessing the Impact of Low Level Chemicals on Development: Behavioural and Latent Effects," *Current Status of Behavioural Pharmacology*, 34, 9 (August 1975): 1835-1844.
139. Weiss, B., et al. "Behavioural Implications of Prenatal and Early Postnatal Exposure to Chemical Pollutants," *Pediatrics*, 53 (1974): 851.
140. Baker, E.L.; Seppalainen, A.M., "Session 3 - Human Aspects of Solvent Neurobehavioural Effects," (Report of the Workshop Session on Clinical and Epidemiological Topics) *Neurotoxicology*, 7 (1986): 43-56.
141. Baker, E.L.; Smith, T.; Landrigan, P., "The Neurotoxicity of Industrial Solvents: A Review of the Literature," *American Journal of Industrial Medicine*, 8 (1985): 207-217.
142. Bardodej, Z.; Vyskocil, J., "The Problem of Trichloroethylene in Occupational Medicine," *Archives of Industrial Health*, 13 (1956): 581-592.
143. Bruhn, P.; Arlien-Soborg, P.; Gyldensted, C.; Christensen, E., "Prognosis in Chronic Toxic Encephalopathy," A Two-year Follow-up Study in 26 House Painters with Occupational Encephalopathy, *Acta Neurol Scand*, 6 (1981): 259-272.
144. Gamberale, F., "Behavioural Effects of Exposure to Solvents; Experimental and Field Studies," Horvath, M. (Ed.), *Adverse Effects of Environmental Chemicals and Psychotropic Drugs, Volume 2* (Amsterdam, The Netherlands: Elsevier Publishing Co., 1976) p 111-133.
145. Gamberale, F.; Hultengren, M., "Toluene Exposure II: Psychophysiological Functions," *Scandinavian Journal of Work, Environment and Health*, 9 (1972): 131-139.

146. Gamberale, F.; Hultengren, M., "Methylchloroform Exposure II: Psychological Functions," *Scandinavian Journal of Work, Environment and Health*, 10 (1973): 82-92.
147. Gamberale, F.; Hultengren, M., "Exposure to Styrene II: Psychophysiological Functions," *Scandinavian Journal of Work, Environment and Health*, 11 (1974): 86-93.
148. Gold, J., "Chronic Perchloroethylene Poisoning," *Canadian Psychiatric Association Journal*, 14 (1969): 627-630.
149. Gregersen, P.; Angelso, B.; Nielsen, T.; Norgaard, B.; Uldal, C., "Neurotoxic Effects of Organic Solvents in Exposed Workers: An Occupational, Neuropsychological and Neurological Investigation," *American Journal of Industrial Medicine*, 5 (1984): 201-225.
150. Haglid, K.; Briving, C.; Hansson, H.A.; Rosengren, L., "Trichloroethylene: Long-lasting Changes in the Brain after Rehabilitation," *Neurotoxicology*, 2 (1981): 659-673.
151. Haglid, K.; Karlsson, J.E.; Kyrklund, T.; Rosengren, L.; Wikgren, A.; Kjellstrand, P., "Animal Models of Neurotoxicity - Aspects of Organic Solvent- induced Alterations in the Gerbil Brain during and after Exposure: Adaptation, Tolerance and Irreversibility," *Organic Solvents and the Central Nervous System* (Copenhagen, Denmark: World Health Organization and Nordic Council of Ministers, 1985), p 136-148.
152. Hanninen, H., "Psychological Picture of Manifest and Latent Carbon Disulphide Poisoning," *British Journal of Industrial Medicine*, 28 (1971): 374-381.
153. Hanninen, H.; Nurimen, H.; Tolonen, M.; Martelin, T., "Psychological Tests as Indicators of Excessive Exposure to Carbon Disulphide," *Scandinavian Journal of Psychology*, 19 (1978): 163-174.
154. King, M.; Day, R.; Oliver, J.; Lush, M.; Watson, J., "Solvent Encephalopathy," *British Medical Journal*, 283 (1981): 663-665.
155. Lindstrom, K., "Changes in Psychological Performances of Solvent-poisoned and Solvent-exposed Workers," *American Journal of Industrial Medicine*, 1 (1980): 69-84.
156. Orbaek, P.; Risberg, J.; Rosen, I.; Haeger-Aronson, B.; Hagstadius, S.; Hjortsberg, U.; Regnell, G.; Rehnstrom, S.; Svensson, K.; Welinder, H., "Effects of Long-term Exposure to Solvents in the Paint Industry," *Scandinavian Journal of Work, Environment and Health*, 11, 2 (1985): 1-28.

157. Salvini, M.; Binaschi, S.; Riva, M., "Evaluation of the Psychophysiological Functions in Humans Exposed to Trichloroethylene," *British Journal of Industrial Medicine*, 28 (1971): 293-295.
158. Seppalainen, A.M.; Husman, K.; Martenson, C., "Neurophysiological Effects of Long-term Exposure to a Mixture of Organic Solvents," *Scandinavian Journal of Work, Environment and Health*, 4 (1978): 304-313.
159. Seppalainen, A.M.; Lindstrom, K.; Martelin, T., "Neurophysiological and Psychological Picture of Solvent Poisoning," *American Journal of Industrial Medicine*, 1 (1980): 31-42.
160. Valciukas, J.; Lilis, R.; Singer, R.; Glickman, L.; Nicholson, W., "Neurobehavioural Changes among Shipyard Painters Exposed to Solvents," *Archives of Environment and Health*, 40 (1985): 47-52.
161. "Organic Solvent Neurotoxicity," *NIOSH Current Intelligence Bulletin*, 48 (1987), U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health.
162. *Organic Solvents and the Central Nervous System* (Copenhagen, Denmark: World Health Organization and Nordic Council of Ministers, 1985), p 1-39.
163. *Diagnostic and Statistical Manual of Mental Disorders*, 3rd Edition (Washington, D.C.: American Psychological Association, 1980), p-241-244.
164. Jones, J.F., et al. "Evidence for Active Epstein-Barr Virus in Patients with Persistent Unexplained Illnesses: Elevated Anti-early Antigen Antibodies," *Annals of International Medicine*, 102 (1985): 1-7.
165. Thomson, G.M., *Report of the Ad Hoc Committee on Environmental Hypersensitivity Disorders* (Government of Ontario: Ministry of Health, August 1985), p 79-80.
166. "In Vivo Diagnostic Testing and Immunotherapy for Allergy," Report I, Part I of the Allergy Panel, Council on Scientific Affairs, *Journal of the American Medical Association*, 258, 11 (Sept.11, 1987): 1363-1367.
167. "In Vivo Diagnostic Testing and Immunotherapy for Allergy," Report-I, Part II of the Allergy Panel, Council on Scientific Affairs, *Journal of the American Medical Association*, 258, 11 (Sept.18, 1987): 1505-1550.

168. Thomson, G.M., *Report of the Ad Hoc Committee on Environmental Hypersensitivity Disorders* (Government of Ontario: Ministry of Health, August 1985), p 116-118.
169. Bronsky, E., et al. "Evaluation of the Provocative Food Skin Test Technique," *Journal of Allergy and Clinical Immunology*, 47 (1971): 104.
170. Crawford, L.V., et al. "A Double-blind Study of Subcutaneous Food Testing," *Journal of Allergy and Clinical Immunology*, 57 (1976): 236.
171. Draper, L., "Food Testing in Allergy: Intradermal Provocative vs. Deliberate Feeding," *Archives of Otolaryngology*, 95 (1972): 160-171.
172. Caplin, "Report of the Food Allergy Committee on the Sublingual Method of Provocative Testing for Allergy," *Annals of Allergy*, 31 (1973): 382-385.
173. Breneman, et al. "Final Report of the Food Allergy Committee of the American College of Allergists on the Clinical Evaluation of the Sublingual Provocative Testing Method for Diagnosis of Food Allergy," *Annals of Allergy*, 33 (1974): 164-165.
174. Jewett, "Abstract," *Journal of Allergy and Clinical Immunology* (1985).
175. Lehman, C., "A Double-blind Study of Sublingual Provocative Food Testing: Study of its Efficacy," *Annals of Allergy*, 45 (1980): 144-149.
176. Van Metre, "A Controlled Study of Effectiveness of Wrinkel Method of Immunotherapy for Ragweed Pollen Hayfever," *Journal of Allergy and Clinical Immunology*, 465 (1980): 288-297.
177. Kailin, "Relieving Therapy for Antigen Exposure," *Journal of the American Medical Association*, 217, 1 (1971): 78.
178. Hirsch, et al. "Wrinkel Injection Therapy: A Multi-centre Controlled Study," *Journal of Allergy and Clinical Immunology*, 68, 2 (1981): 133-155.
179. Rix, K.J.B., et al. "A Psychiatric Study of Patients with Supposed Food Allergy," *British Journal of Psychiatry*, 145 (1984): 121-126.
180. Stewart, "Psychiatric Assessment of Patients with '20th Century Disease'," *Canadian Medical Association Journal*, 133 (Nov. 1985): 1001-1006.

181. Connors, C.K., et al. "Food Additives and Hyperkinesis: A Controlled Double-blind Experiment," *Pediatrics*, 58, 2 (August 1976): 154, 166.
182. Bock, S.A., "Food Sensitivity - A Critical Review and Practical Approach," *American Journal of Diseases in Children*, 134 (1980): 973.
183. Spohn, R.B., "Certain Testing and Treatment Modalities for Allergic Conditions," Presentation by Society for Clinical Ecology, American Academy of Otolaryngic Allergy, and Pan-American Allergy Society, Jan. 1984.
184. Thomson, G.M., *Report of the Ad Hoc Committee on Environmental Hypersensitivity Disorders* (Government of Ontario: Ministry of Health, August 1985), p 162-169.
185. Podell, R.N., "A Critical Review of Published Evaluations of Intracutaneous and Sublingual Provocation and Neutralization," *Archives of Clinical Ecology*, 11, 1 (1983): 13-20.